

peratures of 27° to 30° on the 18th, and on the morning of the 18th they were advised to prepare for a temperature of 25°, which implied a cane-splitting freeze.

The warnings were widely distributed, not only by the Bureau, but by private individuals interested in the sugar crop. The temperature on the morning of the 19th ranged from 22° to 29° in different parts of the sugar and truck growing region.

The following comment from The Daily Picayune of November 19, 1903, concerning the warnings, is of interest.

Sugar planters have been warned by the Weather Bureau to prepare for temperatures as low as 25°, and reports received seem to indicate that they are acting in accordance with the warnings and protecting the cane crop. A temperature of 25° so early in the season would damage the cane crop to the extent of millions of dollars unless protection is accomplished. Since sugar cane grows richer in sugar contents with every day that it is allowed to grow, many planters cut their cane only as fast as they can manufacture sugar. In some seasons grinding is completed without a freeze, and the cane harvested at the close of the season gives much greater production than that harvested at the opening of the season. With a feeling of certainty that he will be warned by the Weather Bureau of an approaching freeze in time to enable him to protect his crop, the planter lets his cane grow until warned by the United States Weather Service to protect his crop. The Weather Bureau has in the past saved millions of dollars to the sugar planter, for there has not been a freeze in recent years but what the lowest temperature which occurred has been announced in warnings issued twenty-four to thirty-six hours in advance of its occurrence.

I. M. Cline, District Forecaster.

CHICAGO FORECAST DISTRICT.

Cold waves.—The month was marked by moderate temperature throughout the first half. The first well-defined cold wave and winter type appeared in the extreme northwest on the morning of the 15th. It moved slowly southward and eastward, following an area of low barometer which had crossed the middle Rocky Mountain region from the Pacific coast. By the morning of the 16th, the cold was felt quite generally west of the Missouri Valley. It continued to increase in intensity, and by the morning of the 17th had overspread the entire district. Exceptionally cold weather prevailed in Montana and zero temperatures occurred in portions of North Dakota, South Dakota, and Minnesota. Warnings of the cold wave were sent to all points in the forecast district on the 15th, and all interests were advised that the first severe cold spell of the winter was approaching.

Storm warnings on the Lakes.—The weather on the Lakes was marked by frequent storms, more or less severe, and storm warnings were displayed many times during the month. The advices of the Weather Bureau were generally closely followed, and but two wrecks of consequence occurred.

The steamer *Waller L. Frost* went ashore on South Manitou Island during the storm of the 9th and 10th, and the vessel and cargo, valued at \$75,000, were a complete loss. The most serious wreck was that of the new steel steamer *J. P. Hutchinson*, which went ashore near Keweenaw Point on the night of November 29 in a northerly gale and snowstorm. The steamer missed the entrance to the Portage Lake canal and went on the rocks. It is badly damaged and may be a total loss. The vessel and cargo of flax seed are valued at nearly \$400,000. Storm warnings were displayed on Lake Superior for two days previous to this wreck, and danger signals were flying at Duluth when the vessel left port.

Snowstorms.—No general heavy snowstorms occurred during the month, but the considerable falls of snow were confined to the upper Lake region, and were due to the influence of the moist Lake winds. The Upper Michigan Peninsula was visited by several heavy snowstorms.

Considerable snow fell over a portion of the city of Chicago on the 26th. The maximum depth of snow reported was 11 inches at South Chicago. A fall of half an inch occurred in the downtown district, while west of Halsted street, a mile away, not even a flurry was seen during the entire day. The

observer at Port Huron states that a storm of a similar character visited his city on the same day, and another local snow-storm occurred in Port Huron on the 6th.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

November was not only dry throughout the district, but unusually mild, except from the 16th to the 19th, during which period very low temperatures spread over the greater part of the district.

For several days prior to the 15th a deep low remained central in the Pacific northwest. The p. m. charts of the 14th gave indications of a southeastward movement, and on the morning of the 15th the depression was central in northern Colorado. A warning of a cold wave was then sent to points in Wyoming and eastern Colorado and of a moderate cold wave in southern Utah and northern Arizona. By the morning of the 16th a sharp fall in temperature had occurred in southern Utah and northern Arizona and strong anticyclonic conditions had developed over the British Northwest Territory, giving a steep gradient over the district and a decided fall in temperature on the middle-eastern slope, extending on the 17th to southern New Mexico. The warnings were timely and doubtless of considerable value to live stock interests.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

A rainless period of nearly two hundred days, with the exception of two days in October, was brought to a close by a storm of moderate intensity on November 4. Rain fell in generous amounts over central and northern California. Southeast storm warnings were displayed from the Southeast Farallon northward to Eureka on the morning of November 3. Southerly winds exceeding 40 miles occurred on the evening of November 3 and the morning of November 4. On November 11 the first well-marked coast storm of the winter occurred. Southeast storm warnings were displayed from Port Harford northward on the morning of November 11. The storm moved southward, as expected, to northern California and then rapidly eastward. Generous rain fell throughout central and northern California. High southerly winds were reported at nearly all stations north of the Tehachapi. Southeast storm warnings from San Francisco to Eureka were displayed on the morning of November 13 and continued on November 14. The warnings were amply verified. Southeast storm warnings were displayed on November 18 and were verified. A moderate disturbance moved southward along the northern coast, but, as in the case of the previous storm, was prevented by an area of high pressure over southern California from passing farther south.

A thunderstorm occurred at San Francisco on the morning of November 23. No rain fell during the month in southern California.—*Alexander G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The weather in the North Pacific States during November was very stormy, with excessive precipitation and normal temperature. No extremely cold weather occurred and no cold-wave warnings were issued.

Several severe storms passed eastward over the district during the month, and timely warnings of their approach were given by this office. The storms of the 5th, 9th, 11th, and 14th were the most noteworthy, and unusually high winds accompanied their movement.

On the night of November 5 the steam schooner *Charles Nelson*, loaded with lumber and en route from Westport, Oreg., to San Pedro, foundered off the southern Oregon coast